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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/506,481	07/13/2005	Catherine Callens	12928/10018	2819
26646 7590 03/04/2008 KENYON & KENYON LLP ONE BROADWAY NEW YORK, NY 10004				
EXAMINER PALABRICA, RICARDO J				
ART UNIT 3663		PAPER NUMBER		
MAIL DATE 03/04/2008		DELIVERY MODE PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/506,481

**Applicant(s)**

CALLENS ET AL.

**Examiner**

Rick Palabrica

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 January 2008.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 14-18 and 23-25 is/are pending in the application.  
4a) Of the above claim(s) 23-25 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 14-18 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date 1/25/08  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Inventor's Patent Application  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Applicant's submission filed on 1/25/08, which traversed the rejection of claims in the 10/22/07 Office action, has been entered. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 14-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to

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which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 14 recites in the preamble, "a method for designing a nuclear fuel assembly." Underlining provided.

Applicant describes the nuclear fuel assembly as comprising a plurality of elements as follows:

*"FIG. 1 illustrates a nuclear fuel assembly 1 which mainly comprises a square-based lattice 2 for nuclear fuel rods 3 and a control cluster 4."*

*"The assembly 1 comprises grids 5 for maintaining the rods 3, which grids 5 are distributed over the height of the rods 3. A lower end piece 6 is arranged under the lower ends of the rods 3 and an upper end piece 7 above the upper ends of the rods 3. The upper end piece 7 is provided with springs 8 for pressing against the upper bearing plate of the reactor core, in which the assembly 1 is intended to be placed."*

*"The rods 10 are carried at the upper ends thereof by a support 11 which is generally referred to as a spider."*

*"As illustrated more particularly in FIG. 2, the spider 11 comprises a vertical central upper head 12 and a series of arms or vanes 13 which extend radially outwards from the lower end of the upper head 12 as far as the radially outer ends 14 thereof."*

*"The upper head 12 of the spider 11 has a central blind hole 15 which opens towards the bottom and in which a damping helical spring 16 is received. The spring 16 extends vertically along a center axis A. A tightening screw 17 extends substantially over the entire height of the hole 15 and is screwed into the wall 18 delimiting the upper portion of the hole 15."*

*"The lower portion of the screw 17 extends through the base of a retaining ring 20 which rests on the lower end of the spring 16. The head 21 of the screw 17 rests, at the top, against the base of the retaining ring 20 in order to press the spring 16 against the wall 18 of the upper head 12."*

*"As illustrated in FIG. 3 for a control rod 10, each control rod 10 is received in a respective guide tube 24 which is arranged in the lattice 2 of fuel rods 3. In this manner, 24 pairs comprising a guide tube/control rod are formed. Since each of these pairs has a similar structure, only one will be described below."*

*"The guide tube 24 extends from the lower end piece 6 as far as the upper end piece 7. The guide tube 24 comprises a lower portion 26 of reduced inside diameter and an upper portion 27. The lower portion 26 is connected to the lower end piece 6 by a collared screw 28, through which a vertical through-hole 29 extends." Underlining provided. See pages 6-87 of the Specification.*

As presently set forth, claim 14 ends at the step of:

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*"calculating, based on the maximum elevated pressure a maximum circumferential stress produced in the lower damping portion." Underlining provided.*

There is neither an adequate description nor enabling disclosure as to how and in what manner one can design a nuclear fuel assembly with a process that ends at the above-cited step that pertains to part of a single element of a fuel assembly, i.e., the lower damping portion 26, whereas applicant himself admits that this assembly comprises more than said portion. See, for example, the above underlined components of a fuel assembly in applicant's Figs. 1, 2 and 3.

Claim 14 further recites:

*"A method for designing a nuclear fuel assembly which is intended to be positioned in a nuclear reactor,*

*.....*  
*wherein for at least one pair comprising a guide tube/control rod, the method comprising:*

*....."*

The term "at least one pair" applies to and includes a single pair. Also, applicant himself admits that there is a plurality of these guide tube/control rod pairs, e.g., as per the statement above,

*In this manner, 24 pairs comprising a guide tube/control rod are formed.*

Note that each of the 24 pairs of guide tube/control rod is subjected to different flows, temperatures, pressures and structural (e.g., gap dimensions) conditions. For example, the pair near the center of a fuel assembly is subjected to a higher neutron flux (and, therefore, temperature) compared to a pair near the outer periphery of the assembly.

There is neither an adequate description nor enabling disclosure as to how and in what manner one can properly design a nuclear fuel assembly by applying the claimed process to consideration of only one pair of guide tube and control rod.

3. Claims 14-18 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. Steps directed to calculating design parameters of other elements a nuclear fuel assembly, in addition to the lower damping portion, that are critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). See section 2 above.

4. Claims 14-18 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a process that calculates the maximum circumferential stress produced in the lower damping portion of a control rod guide tube, does not reasonably provide enablement for a process of designing an entire nuclear fuel assembly. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make/use the invention commensurate in scope with these claims.

5. Claims 14-18 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: steps directed to calculating

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design parameters of other elements a nuclear fuel assembly, i.e., not only those for the lower damping portion of the control rod guide tube.

6. Claims 14-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are vague, indefinite and incomplete, and its metes and bounds cannot be determined, for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted element is the step that extrapolates the calculation based on a single guide tube/control rod pair to the calculation applying to the entire fuel assembly that comprises a plurality of said pairs.

### ***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 14-18 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The claimed invention is directed to a judicial exception to 35 U.S.C. 101 (i.e., an abstract idea, natural phenomenon, or law of nature) and is not directed to a practical application of such judicial exception (e.g., because the claim does not require any physical transformation and the invention as claimed does not produce a useful, concrete, and tangible result).

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The claims (e.g., claim 14) essentially calculate "a maximum circumferential stress produced in the lower damping portion" of a control rod guide tube. Execution of the steps of the claimed process results in nothing more than a numerical value of a parameter associated with a part of the fuel element. Thus, the claimed process does nothing more than solve a mathematical problem by manipulating numbers in equations (which applicant did not invent) and does not produce a useful, concrete and tangible result. Specifically, the claimed process does not result in a design of a nuclear fuel assembly, contrary to the statement in the preamble.

Note MPEP 2106.02 (Mathematical Algorithms) which states:

*"Claims to processes that do nothing more than solve mathematical problems or manipulate abstract ideas or concepts are complex to analyze and are addressed herein. If the "acts" of a claimed process manipulate only numbers, abstract concepts or ideas, or signals representing any of the foregoing, the acts are not being applied to appropriate subject matter. Gottschalk v. Benson, 409 U.S. 63, 71 - 72, 175 USPQ 673, 676 (1972). Thus, a process consisting solely of mathematical operations, i.e., converting one set of numbers into another set of numbers, does not manipulate appropriate subject matter and thus cannot constitute a statutory process."*

Note also MPEP 2106.V.C.2 (Practical Application That Produces a Useful, Concrete, and Tangible Result):

*For purposes of an eligibility analysis, a physical transformation "is not an invariable requirement, but merely one example of how a mathematical algorithm [or law of nature] may bring about a useful application." AT & T, 172 F.3d at 1358-59, 50 USPQ2d at 1452. If USPTO personnel determine that the claim does not entail the transformation of an article, then USPTO personnel shall review the claim to determine it produces a useful, tangible, and concrete result. In making this determination, the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete, but rather on whether the final result achieved by the claimed invention is "useful, tangible, and concrete." In other words, the claim must be examined to see if it includes anything more than a 35 U.S.C. 101 judicial exception. If the claim is directed to a practical application of a 35 U.S.C. 101 judicial exception, USPTO personnel must then determine whether the claim preempts the judicial exception. If USPTO personnel do not find such a practical application, then USPTO personnel have determined that the claim is nonstatutory.*



***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Palabrica whose telephone number is 571-272-6880. The examiner can normally be reached on 6:00-4:30, Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rick Palabrica/  
Primary Examiner, Art Unit 3663

February 25, 2008